Amendments to the Claims

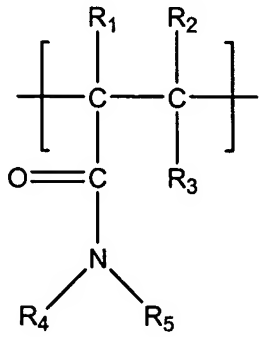
This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Previously presented) A synthetic co-polymer comprising one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety, said synthetic co-polymer having a number average molecular mass between about 2,000 and about 1,000,000, wherein said synthetic co-polymer is reactive with primary amines via the pendant cross-linkable moiety.

2. (Original) The synthetic co-polymer according to claim 1, wherein:

(a) said N-alkyl or N,N-dialkyl substituted acrylamide co-monomer has a structure of Formula I:

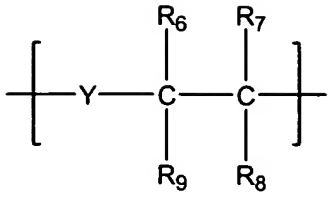


I

wherein:

R_1, R_2, R_3, R_4 and R_5 are independently selected from the group of: H and lower alkyl;

(b) said hydrophilic co-monomer has a structure of Formula II:



II

wherein:

Y is O or is absent;

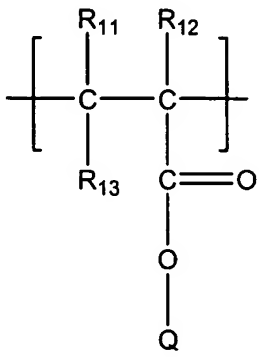
R_6, and R_7 are independently selected from the group of H and lower alkyl;

R_8 is H, lower alkyl or -OR', where R' is H or lower alkyl; and

R_9 is H, lower alkyl or $-C(O)R_{10}$, and

R_{10} is $-NR_4R_5$ or -OR", where R" is H or CH_2CH_20H; and

(c) said acryl- or methacryl- carboxylic acid co-monomer has a structure of Formula III:



III

wherein:

R_{11}, R_{12} and R_{13} are independently selected from the group of: H and lower alkyl, and

Q is N-succinimido, 3-sulpho-succinimdo (sodium salt), N-benzotriazolyl, N-imidazolyl and p-nitrophenyl.

3. (Currently amended) The synthetic co-polymer according to claim 1 [[or 2]], wherein said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and said one or more hydrophilic co-monomer are the same.

4. (Currently amended) The synthetic co-polymer according to claim 1 [[or 2]], wherein said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and said one or more hydrophilic co-monomer are different.

5. (Currently amended) The synthetic co-polymer according to ~~any one of claims 1 to 4~~ claim 1, wherein said alkyl or lower alkyl is a straight or branched chain alkyl group having between one and eight carbon atoms.

~~The synthetic co-polymer according to any one of claims 1 to 4, wherein said alkyl or lower alkyl is cycloalkyl group having between three and six carbon atoms.~~

6. (Original) The synthetic co-polymer according to claim 2, wherein the combined molar ratio of N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and hydrophilic co-monomer is between about 50% and about 99.5% and the molar ratio of derivatised acryl- or methacryl-carboxylic acid co-monomer is between about 0.5% and about 50%, wherein the sum of said molar ratios is 100%.

7. (Original) The synthetic co-polymer according to claim 3, wherein the molar ratio of N-alkyl or N,N-dialkyl substituted acrylamide co-monomer is between about 50% and about 90%, the molar ratio of the hydrophilic co-monomer is between about 5% and about 50% and the molar ratio of derivatised acryl- or methacryl- carboxylic acid co-monomer is between about 0.1 % and about 15%, wherein the sum of said molar ratios is 100%.

8. (Currently amended) The synthetic co-polymer according to ~~any one of claims 1 to 8~~ claim 1, wherein said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer is selected from the group of N-methylacrylamide, N-ethylacrylamide, N isopropylacrylamide (NiPAAm), N-octylacrylamide, N-cyclohexylacrylamide, N-methyl-N-ethylacrylamide, N-methylmethacrylamide, N-ethylmethacrylamide, N-isopropylmethacrylamide, N,N-dimethylacrylamide, N,N-diethylacrylamide, N,N-dimethylmethacrylamide, N,N-

diethylmethacrylamide, N,N-dicyclohexylacrylamide, N-methyl-N-cyclohexylacrylamide, N-acryloylpyrrolidine, N-vinyl-2-pyrrollidinone, N-methacryloylpyrrolidine, and combinations thereof.

9. (Currently amended) The synthetic co-polymer according to ~~any one of claims 1 to 9~~ claim 1, wherein said one or more hydrophilic co-monomer is a selected from the group of: acrylic acid, methacrylic acid, 2-hydroxyethyl methacrylate (HEMA), N,N dimethylacrylamide, N,N-diethylacrylamide, 2-[N,N-dimethylamino]ethylacrylamide, 2-[N,N-diethylamino]ethylacrylamide, N,N-diethylmethacrylamide, 2-[N,N-dimethylamino] ethylmethacrylamide, 2-[N,N-diethylamino]ethylmethacrylamide, 2-vinyl-N-pyrrollidone, 2-[N,N-diethylamino] ethylacrylate, 2-[N,N-dimethylamino]ethylacrylate, 2-[N,N-diethylamino]ethylmethacrylate, 2-[N,N-dimethylamino]ethylmethacrylate, and combinations thereof.

10. (Currently amended) The synthetic co-polymer according to ~~any one of claims 1 to 10~~ claim 1, wherein said one or more acryl- or methacryl-carboxylic acid co-monomer is selected from the group of acrylic acid, methacrylic acid, and substituted versions thereof, and said cross-linkable moiety is a succinimidyl group, an imidazole, a benzotriazole, ap-nitrophenol or 2-(N-morpholino)ethanesulphonic acid.

11. (Original) The synthetic co-polymer according to claim 2 that comprises N,N-dimethylacrylamide and N-acryloxysuccinimide.

12. (Original) The synthetic co-polymer according to claim 3 that comprises N-isopropylacrylamide, acrylic acid and N-acryloxysuccinimide.

13. (Currently amended) A bio-synthetic matrix comprising:

(a) the synthetic co-polymer according to ~~any one of claims 1 to 13~~ claim 1;

(b) a bio-polymer; and

(c) an aqueous solvent,

wherein said synthetic co-polymer and said bio-polymer are cross-linked through said pendant cross-linkable moiety to form a hydrogel.

14. (Currently amended) The bio-synthetic matrix according to ~~claim 14~~ claim 13, wherein the amount of synthetic co-polymer is between about 0.1 % and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.

15. (Currently amended) The bio-synthetic matrix according to ~~claim 14 or 15~~ claim 13, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

16. (Currently amended) The bio-synthetic matrix according to ~~any one of claims 14 to 16~~ claim 13 further comprising one or more bioactive agent.

17. (Currently amended) The bio-synthetic matrix according to ~~claim 17~~ claim 16, wherein said one or more bioactive agent is covalently bonded to said synthetic co-polymer through said pendant cross-linkable moiety.

18. (Currently amended) The bio-synthetic matrix according to ~~claim 18~~ claim 16, wherein said bioactive agent comprises the pentapeptide having the sequence YIGSR (SEQ ID NO:1).

19. (Currently amended) The bio-synthetic matrix according to ~~claim 17~~ claim 16, wherein said one or more bioactive agent is dispersed in said matrix.

20. (Currently amended) The bio-synthetic matrix according to ~~any one of claims 14 to 20~~ claim 13, further comprising a plurality of cells dispersed in said matrix.

21. (Currently amended) ~~Use of~~ A method for regenerating tissue in an animal comprising the step of implanting the bio-synthetic matrix according to ~~any one of claims 14 to 21~~ claim 13 such that said bio-synthetic matrix acts as a scaffold for tissue regeneration in ~~an~~ said animal ~~in need thereof~~.

22. (Currently amended) ~~Use of~~ A method for replacing damaged or removed tissue in an animal comprising the step of implanting the bio-synthetic matrix according to ~~any one of claims 14 to 21~~ claim 13 ~~for replacement of damaged or removed tissue~~ in ~~an~~ said animal ~~in need thereof~~.

23. (Currently amended) The ~~use~~ method according to ~~claim 23~~ claim 22, wherein said tissue is skin or part of an organ.

24. (Currently amended) The ~~use~~ method according to ~~claim 23~~ claim 22, wherein said tissue is a cornea or a part of a cornea.

25. (Currently amended) ~~Use of~~ A method for coating a surgical implant comprising the step of applying the bio-synthetic matrix according to ~~any one of claims 14 to 21~~ claim 13 to a surface of said ~~for coating~~ surgical ~~implants~~ implant.

26. (Currently amended) A composition comprising:

(a) one or more bioactive agent;

(b) the synthetic co-polymer according to ~~any one of claims 1 to 13~~ claim 1;

(c) a bio-polymer; and

(d) an aqueous solvent.

27. (Currently amended) A composition comprising:

(a) a plurality of cells;

(b) the synthetic co-polymer according to ~~any one of claims 1 to 13~~ claim 1;

(c) a bio-polymer; and

(d) an aqueous solvent.

28. (Currently amended) The composition according to claim 27 [[or 28]], wherein the amount of synthetic polymer is between about 0.1% and about 30% by weight, the amount of

bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.

29. (Currently amended) The composition according to ~~any one of claims 27 to 29~~ claim 27, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

30. (Currently amended) The composition according to ~~any one of claims 27 to 30~~ claim 27, wherein said synthetic co-polymer and said bio-polymer are cross-linked.

31. (Currently amended) The composition according to ~~any one of claims 27 to 31~~ claim 27, wherein said bioactive agent is covalently attached to said synthetic co-polymer through said pendant cross-linkable moiety.

32. (Currently amended) The composition according to ~~any one of claims 27 to 30 or 32~~ claim 27, which is formulated as an injectable solution, wherein said synthetic co-polymer and said bio-polymer are capable of cross-linking to form a hydrogel in vivo.

33. (Currently amended) The composition according to ~~any one of claims 27 to 32~~ claim 27, which is a pre-formed hydrogel.

34. (Currently amended) An implant for use in tissue engineering comprising a pre-formed bio-synthetic matrix, said matrix comprising an aqueous solvent and a bio-polymer cross-linked with the synthetic co-polymer according to ~~any one of claims 1 to 13~~ claim 1.

35. (Currently amended) The implant according to ~~claim 35~~ claim 34, wherein said bio-polymer is selected from the group of. collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

36. (Currently amended) The implant according to ~~claim 35 or 36~~ claim 34, wherein the amount of synthetic polymer is between about 0.1 % and 30% by weight, the amount of bio-

polymer is between about 0.3% and 50% by weight and the amount of aqueous solvent is between about 20% and 99.6% by weight.

37. (Currently amended) The implant according to ~~any one of claims 35 to 37~~ claim 34, wherein said bio-synthetic matrix supports in-growth of nerves.

38. (Currently amended) The implant according to ~~any one of claims 35 to 38~~ claim 34, further comprising one or more bioactive agent.

39. (Currently amended) The implant according to ~~claim 39~~ claim 38, wherein said bioactive agent is covalently attached to co-polymer through said pendant cross-linkable moiety.

40. (Currently amended) The implant according to ~~any one of claims 35 to 40~~ claim 34, further comprising a plurality of cells dispersed in said matrix.

41. (Currently amended) The implant according to ~~claim 41~~ claim 40, wherein said cells are stem cells or precursor cells.

42. (Currently amended) Use of the implant according ~~to any one of claims 35 to 40~~ claim 34 as an artificial cornea.

43. (Original) A process for preparing a synthetic co-polymer comprising:

(a) dispersing one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety in a solvent in the presence of an initiator;

(b) allowing said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl-carboxylic acid co-monomer to polymerise to form a synthetic co-polymer, and

(c) optionally purifying said synthetic co-polymer.

44. (Currently amended) A process for preparing a bio-synthetic matrix comprising the steps of :

(a) preparing a synthetic co-polymer by the process according to ~~claim 44~~ claim 43;

(b) dispersing said synthetic co-polymer and a bio-polymer in an aqueous medium; and

(c) allowing said synthetic co-polymer and said bio-polymer to cross-link to provide said bio-synthetic matrix.

45. (Currently amended) The process according to ~~claim 44 or 45~~ claim 43, wherein the N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and the hydrophilic co-monomer are the same.

46. (Currently amended) The process according to ~~claim 44 or 45~~ claim 43, wherein the N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and the hydrophilic co-monomer are different.

47. (Currently amended) The process according to ~~claim 45~~ claim 44, further comprising mixing said synthetic co-polymer with one or more bioactive agent prior to step (b) and allowing said bioactive agent to cross-link to said synthetic co-polymer through said pendant cross-linkable moiety.

48. (Currently amended) The process according to ~~claim 45~~ claim 44, further comprising mixing said synthetic co-polymer and said bio-polymer with a plurality of cells in step (b).

49. (Currently amended) A synthetic co-polymer produced by the process according to ~~claim 44~~ claim 43.

50. (Currently amended) A bio-synthetic matrix produced by the process according to ~~claim 45~~ claim 44.

51-110. (Cancelled)

111. (New) The synthetic co-polymer according to claim 1, wherein said alkyl or lower alkyl is cycloalkyl group having between three and six carbon atoms.

112. (New) The composition according to claim 26, wherein the amount of synthetic polymer is between about 0.1% and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.

113. (New) The composition according to claim 26, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

114. (New) The composition according to claim 26, wherein said synthetic co-polymer and said bio-polymer are cross-linked.

115. (New) The composition according to claim 26, wherein said bioactive agent is covalently attached to said synthetic co-polymer through said pendant cross-linkable moiety.

116. (New) The composition according to claim 26, which is formulated as an injectable solution, wherein said synthetic co-polymer and said bio-polymer are capable of cross-linking to form a hydrogel in vivo.

117. (New) The composition according to claim 26, which is a pre-formed hydrogel.